Technological Spillovers from Foreign Direct Investment:
the case of Vietnam

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January 11th , 2005

Incentives of the study

- The importance of FDI in the economic development Vietnam.
- The situation of few researches on the impacts of FDI in Vietnam, especially technological spillover effects.

Objectives of the study

- To figure out the channels of spillovers from FDI in Vietnam.
- To find out whether there is any spillover effect and what factors influence this effect of FDI in the Vietnam.

Methodology

- Analyzing recent trend and characteristics of FDI and Vietnam's economy since Doimoi policy.
- Doing empirical work on Vietnam's Industry using industry-level panel data during 1995-1999 and 2000-2002 periods.

Outline

1. Presenting previous empirical studies on technological spillovers from FDI of other countries.

2. Presenting the analysis of FDI in Vietnam.

3. Presenting the empirical study.

4. Giving concluding remarks.

1. <u>**Previous empirical studies on technological spillovers from FDI**</u>

Channels		Impacts
Horizontal effects	① Demonstration	**(+)**
	② Competition	(+), (-)
	③ Labor turnover	(+)
Vertical effects	① Backward linkages	(+)
	② Forward linkages	(+)

Results of researches: mixed results (significant, insignificant, positive, negative spillovers).

| Factors influencing spillovers	Impacts
① Technology gap between MNCs and host country enterprises	Mixed
② Competition of host country market	(+)
③ Export-oriented or non-exporting domestic firms	Mixed
④ Ownership structure and size of MNCs	Mixed
⑤ Export-oriented or import-substitution MNCs	(+) in favor of import-substitution
⑥ Methodology of researches	

Implications for Vietnam's case:

- Demonstration effect may be big, negative competition is for some industrial sectors only.

- Domestic private sector plays an important role

2. Recent trend and characteristics of FDI and Vietnam's economy:

Recent trend of FDI

- A similarity in trends of FDI inflows and growth of Vietnam's economy.

- Largest proportion of FDI inflows accounted for by Asian countries.

- Large shares in FDI taken by industry (particularly manufacturing) and service.

- FDI concentrated on Hanoi, Ho Chi Minh City and in southern regions.

- A tendency in favor of 100 percent foreign-owned enterprises.

- A large number of small and medium-sized projects.

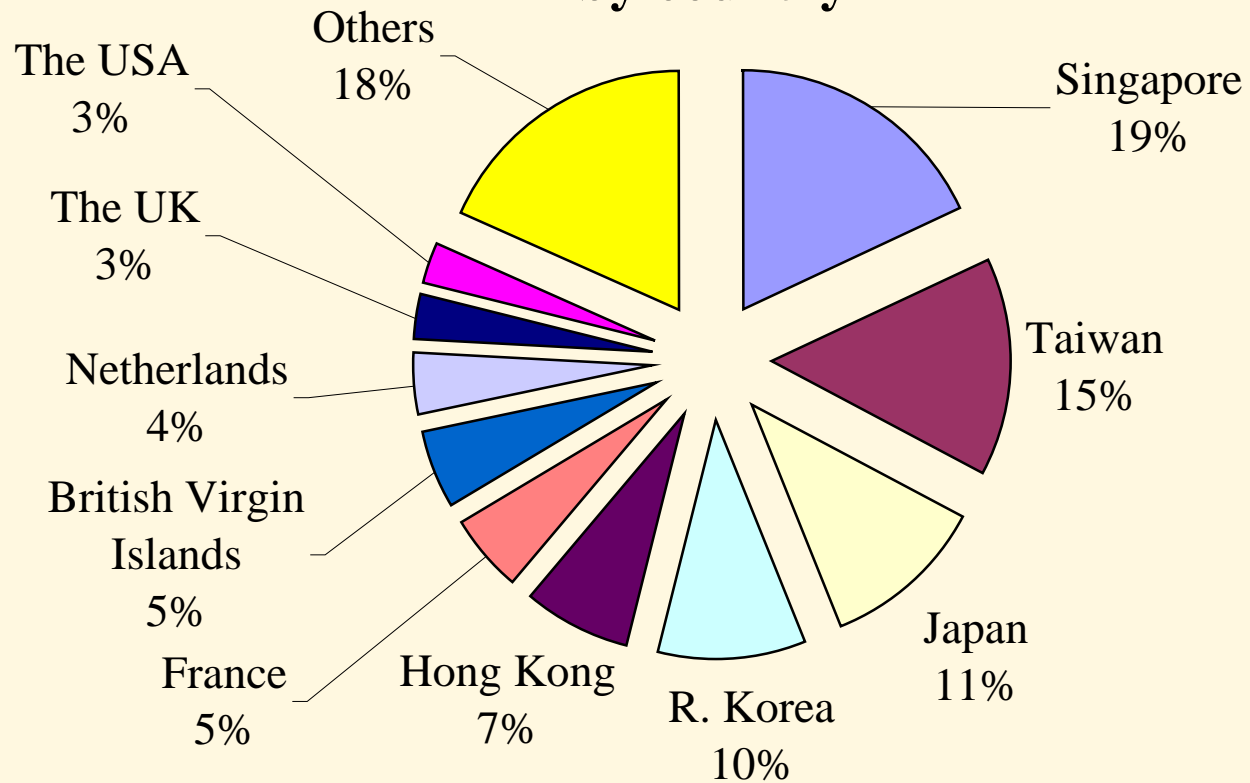**Figure 1**
GDP growth
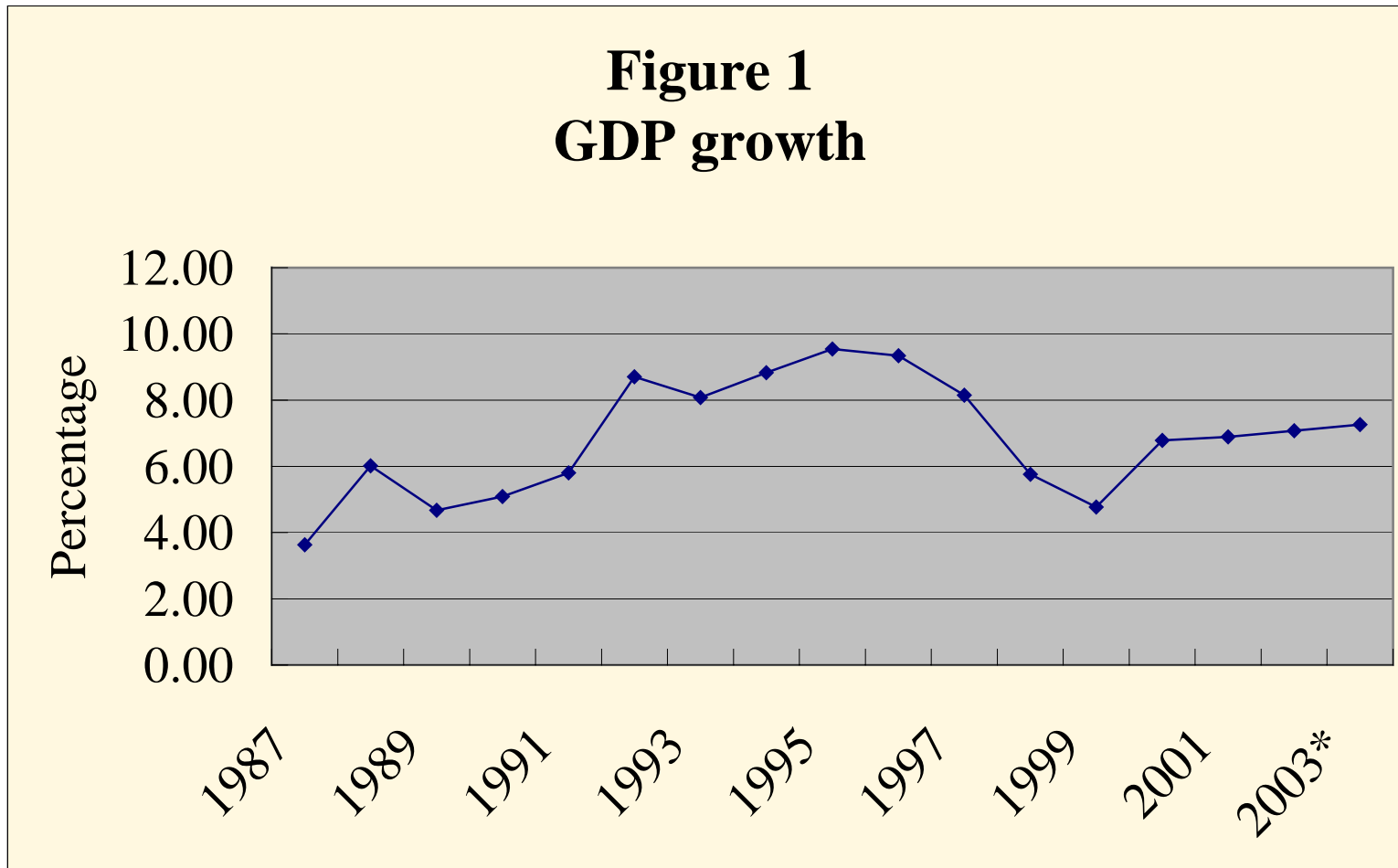
Source: GSO, 2004

Figure 2
FDI inflows in Vietnam 1988-2003
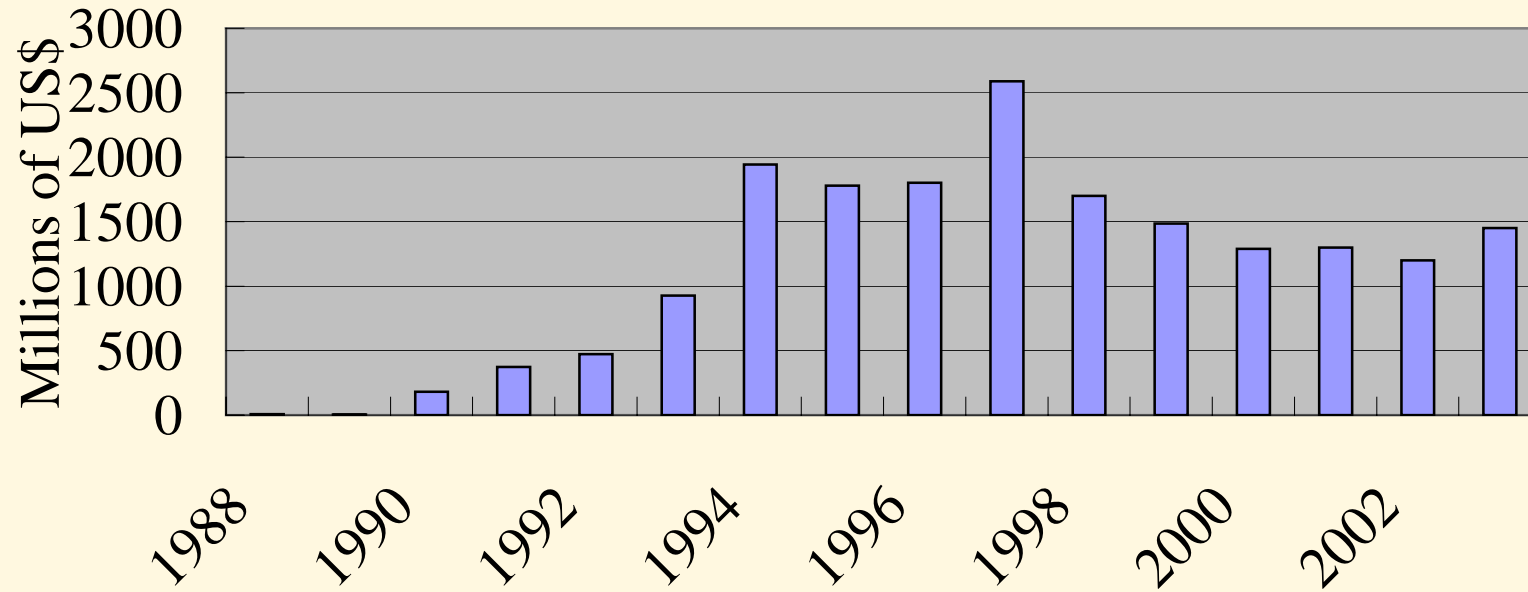
Source: UNCTAD, 2004
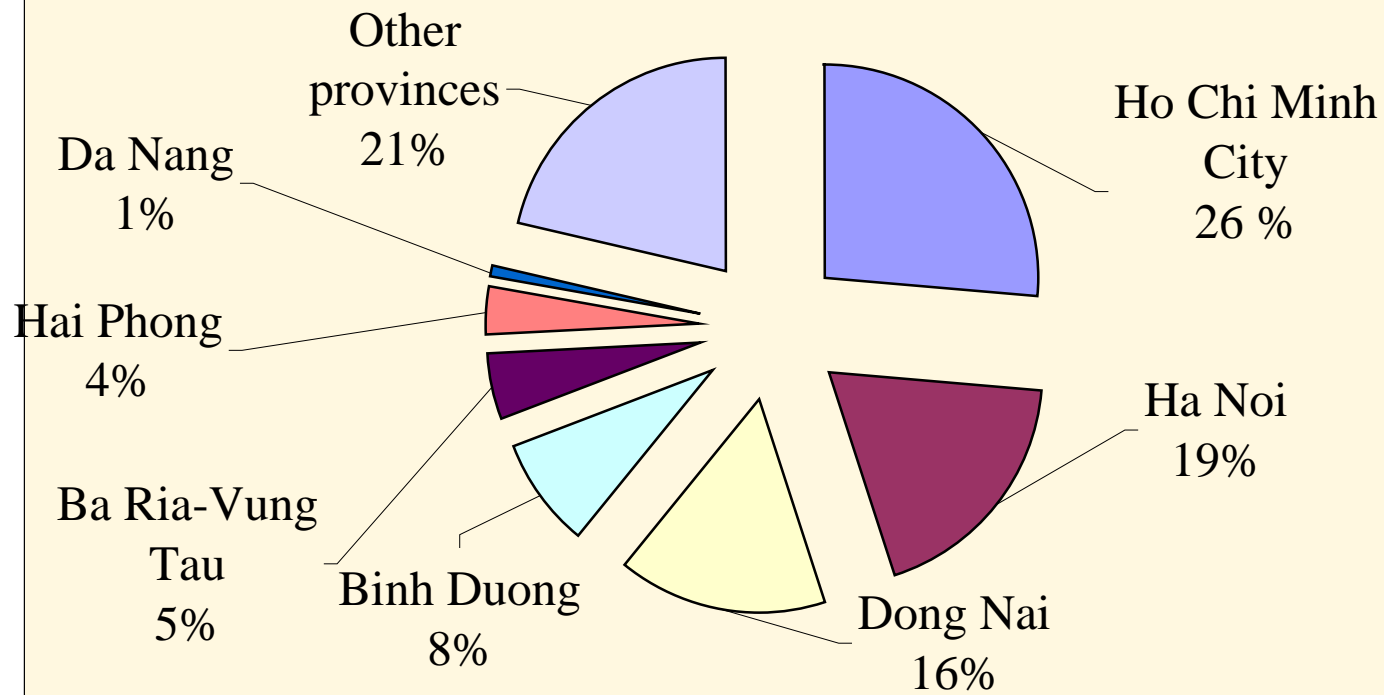
Figure 3
Foreign Direct Investment in Vietnam 1988-2003
by country

Source: Ministry of Planning and Investment, 2004

Figure 4
Foreign Direct Investment in Vietnam 1988-2003 by province

Other provinces 21%

Da Nang 1%

Hai Phong 4%

Ba Ria-Vung Tau 5%

Binh Duong 8%

Dong Nai 16%

Ha Noi 19%

Ho Chi Minh City 26 %

Source: Ministry of Planning and Investment, 2004

Figure 5
Foreign Direct Investment in Vietnam 1988-2003 by region

Mekong Delta 3%

Red River Delta 30%

North East 2%

North West 0.1%

North Central Coast 3%

South East 57%

Central Highland 3%

South Central Coast 2%
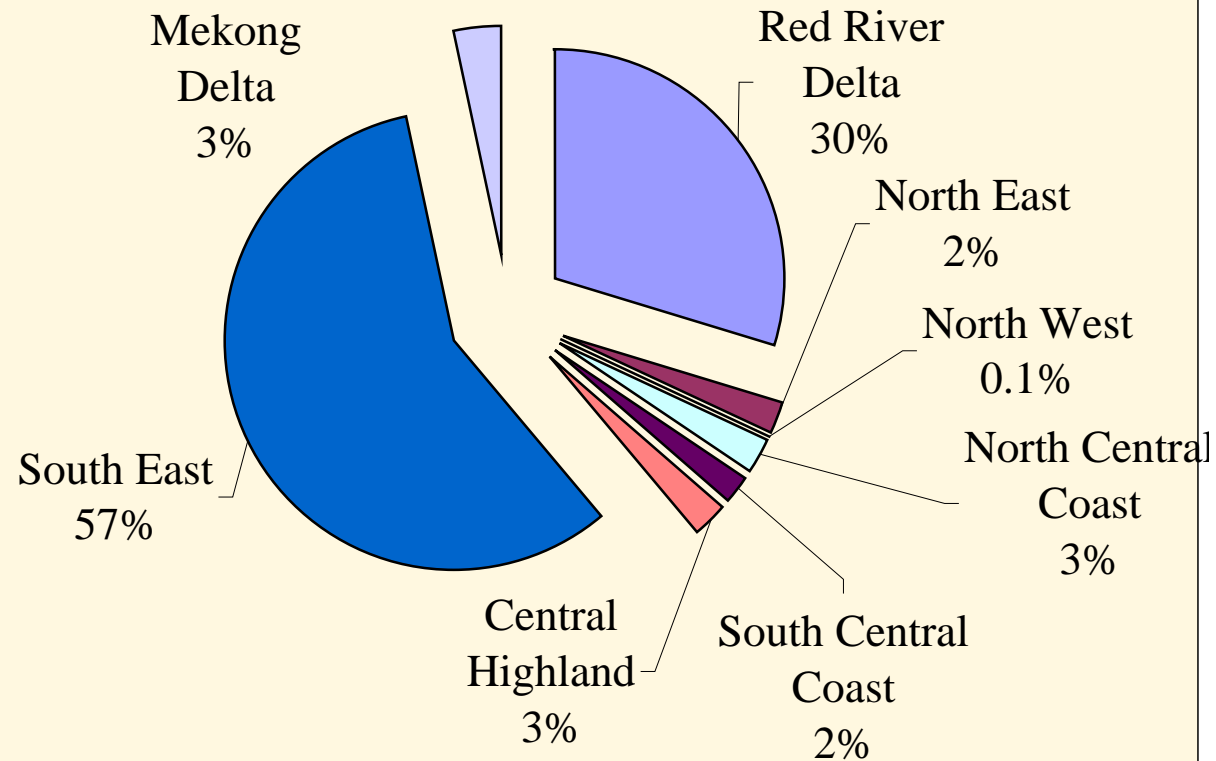
Source: Ministry of Planning and Investment, 2004

Table 1

FDI in Vietnam by type, 2001

| Form of FDI	Number of Projects	Approved Capital (US$ million)	Realized Capital (US$ million)	Project size (US$ million)
BOT	6	1,228	40	204.7
BCC	139	4,052	3,274	29.2
100% foreign-owned	1,858	12,414	5,663	6.7
JV	1,043	20,167	9,716	19.3
Total	**3,046**	**37,861**	**18,694**	**12.4**

Source: Bui, 2004

Impacts of FDI on Vietnam's Economy:

- Contribution to total investment as well as promoting domestic investment.

- Contribution to state revenue, GDP and industrial output

- Enlarging export markets and promoting domestic sector's exports

- Introducing new and advanced technologies, training local staffs.

Impacts of FDI on Vietnam's Industry

- Contribution to structural changes in industrial output, development of new industrial sectors (a possibility of backward linkage effects).

- Contribution of advanced technologies, increasing competition.

Figure 6
Investment by ownership
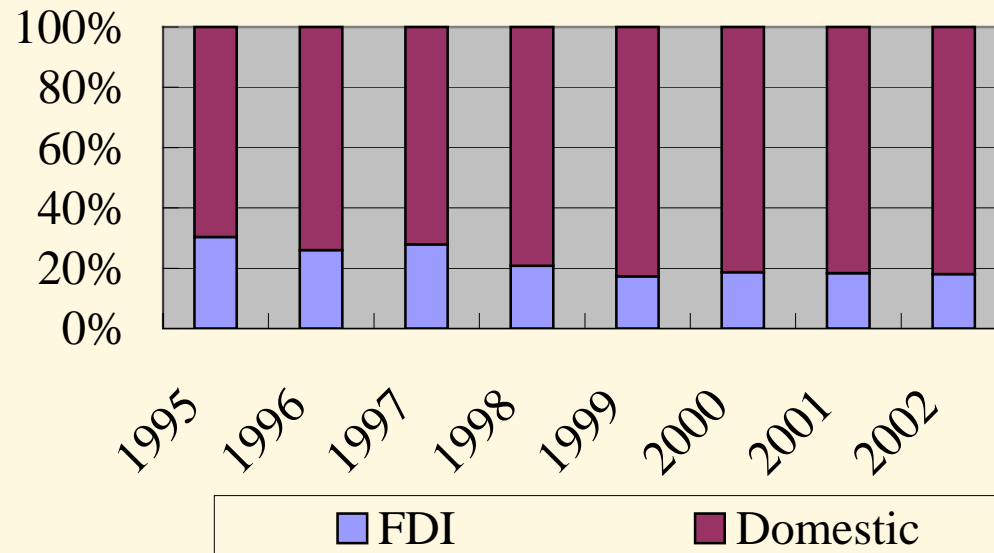
Source: GSO, 2004

Figure 7
FDI shares in GDP and industrial ouput

ource: GSO, 2004

*estimated data

Figure 8
FDI exports by percent
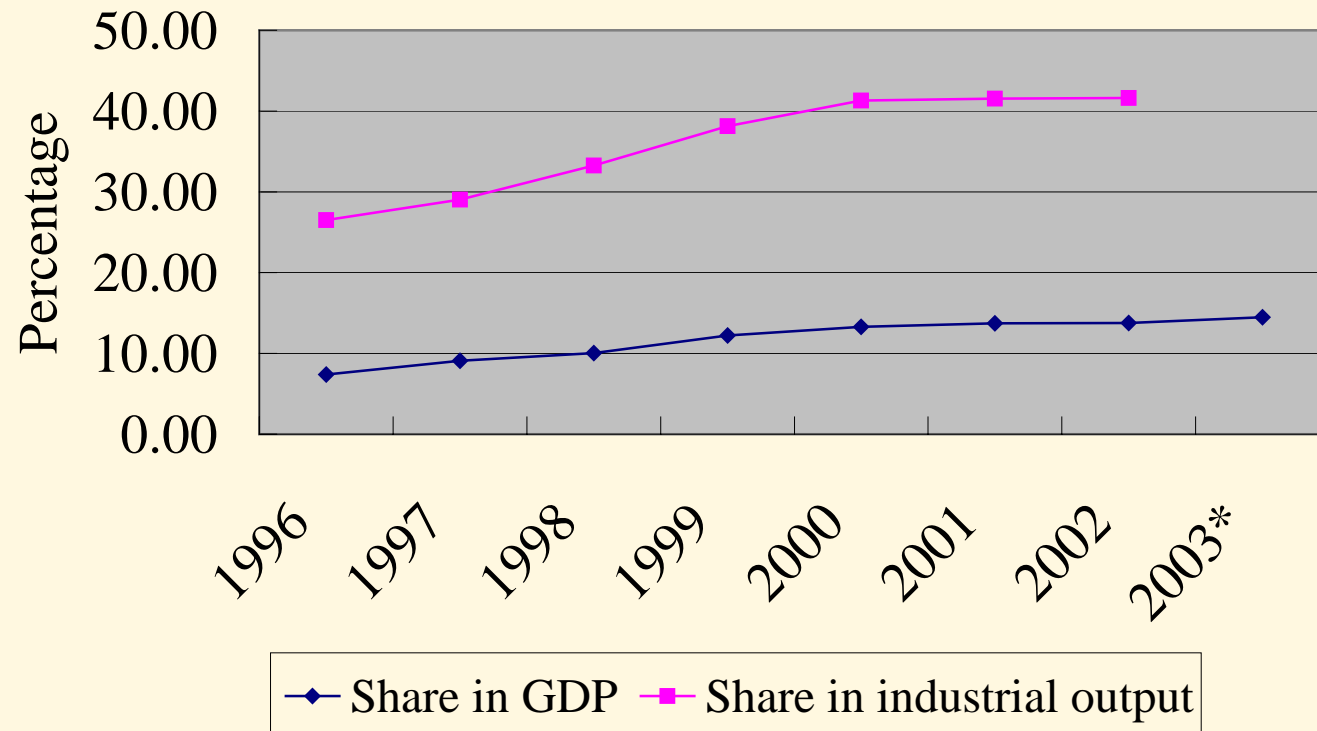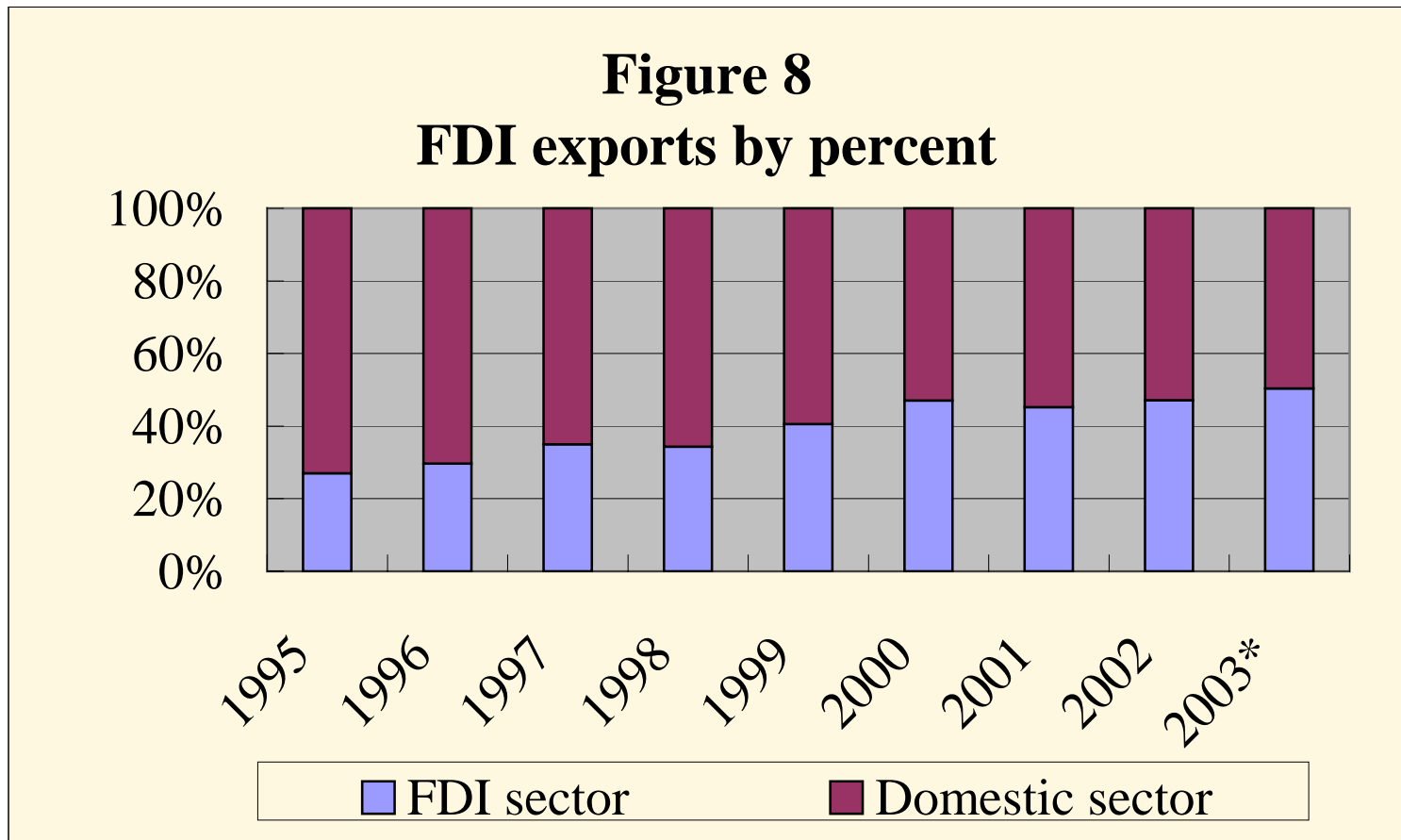
Source: GSO, 2004

*: estimated data

Figure 9
Growth of exports by ownership
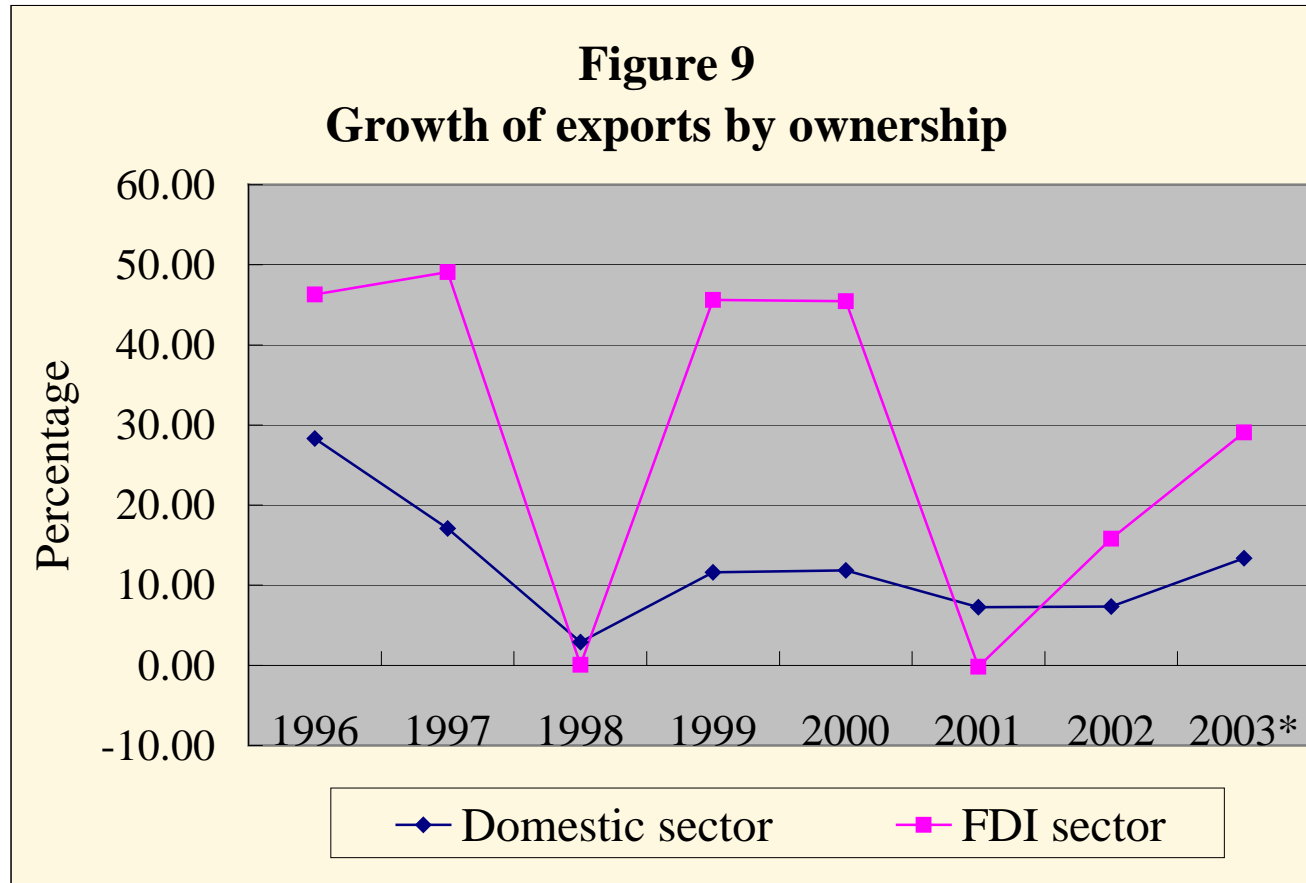
3. Empirical study on spillovers from FDI in Vietnam's industry:

Data description

● Industry-level panel data of 29 industrial sectors.

● 1995-1999 and 2000-2002 periods

Model

$$Y_i^{\,d} \;=\; (K_i^{\,d})^{\alpha}\,(L_i^{\,d})^{1-\alpha}\,e^{Z_i} \qquad (1)$$

where $Y_i^{\,d}$: output of domestic sector

$$K_i^{\ d}, L_i^{\ d} \quad \text{: capital and labor of domestic sector}$$

$$Z_i \qquad \text{: externalities}$$

$$Y_i^{\ d} = (K_i^{\ d})^{\alpha}(L_i^{\ d})^{1-\alpha}\, e^{\beta *GOV}\, e^{\gamma *FOR} \tag{2}$$

where α, β, γ : parameters

GOV : output share of SOEs to the whole industry's output

FOR : share in employment of foreign sector to the whole industry's employment

$$\frac{Y_i^{\ d}}{L_i^{\ d}} = \left(\frac{K_i^{\ d}}{L_i^{\ d}} \right)^{\alpha} e^{\beta \,*\, GOV} \; e^{\gamma \,*\, FOR} \tag{3}$$

$$\ln\left(\frac{Y_{it}^{\ d}}{L_{it}^{\ d}} \right) = \mu + \alpha \ln\left(\frac{K_{it}^{\ d}}{L_{it}^{\ d}} \right) + \beta GOV_{it} + \gamma FOR_{it} + \varepsilon_{it} \tag{4}$$

$$\ln\left(\frac{Y_{it}^{\ d}}{L_{it}^{\ d}} \right) = \mu + \alpha \ln\left(\frac{K_{it}^{\ d}}{L_{it}^{\ d}} \right) + \beta GOV_{it} + \gamma FOR_{it} + \lambda FOR_{it} \,*\, proxy_{it} + \varepsilon_{it} \tag{5}$$

where proxy=(PRG, CAI, PRI)

PRG   : ratio of gross output per employee in foreign sector to that of the whole industry

CAI   : capital-labor ratio of foreign sector in each industry

PRI   : share in output of domestic private sector to the whole industry

Prediction for results:

α : positive

β : positive

γ : positive

λ : negative for *PRG, CAI*, positive for *PRI*

Estimated Results:

- Table 3: significant positive spillover (coefficient of *FOR*) in 1995-1999 and insignificant positive spillover in 2000-2002 (market-stealing effects in the latter case).
- Table 4: spillovers are bigger in favor of labor intensive industrial sectors during 1995-1999, the impact is insignificant as for 2000-2002. (indirect expression of technology gap and export-oriented impacts).

- Table 5: spillovers are bigger in favor of smaller technology gap between foreign and domestic sectors during 1995-1999 and the difference is insignificant as for 2000-2002.
- Table 6: spillovers are bigger in industrial sectors with larger proportion of domestic private sector in 2000-2002 (linkage role of domestic private sector in spillover effects).

Discussion of results:

- Endogenous bias problem.
- Aggregate industry level data.

	Table 3: Dependent variable: labor productivity of domestic sector					
Period	1995-1999			2000-2002		
	Fixed effects		Random Effects+		Fixed effects	Random Effects+
No of observations	143				84	
R2	0.3173		0.3940		0.0644	0.2287
Constant	-5.023734 (0.4187228)	**	-4.543374 (0.29246)	**	-6.829876 (5.157828)	-5.487061 (1.532057) **
Capital-labor ratio	0.0657692 (0.0304668)	**	0.0812018 (0.03095)	**	-0. 9643787 (0. 7387776)	0. 0649326 (0. 3569135)
GOV	0.0304646 (0.0065966)	**	0.0211598 (0.00413)	**	0. 1063964 (0. 0864823)	-0. 0041546 (0. 0195909)
FOR	0.0307388 (0.0069492)	**	0.0256331 (0.00478)	**	0. 066886 (0. 0614172)	0. 0406693 (0. 0234803)

Table 4: Spillovers with capital-intensity

Dependent variable: labor productivity of domestic sector

Period	1995-1999		2000-2002	
	(i)	(ii)	(i)	(ii)
No of observations	130		81	
R2	0.5828	0.5504	0.2138	0.2415
Constant	-4.640354	-4.374162	-6.462007	-7.856337
	(0. 2516576) **	(0. 3158745) **	(1.77885) **	(2.149191) **
Capital-labor ratio	-0. 020698	-0. 0012018	-0. 1423918	0. 399172
	(0. 0308401)	(0. 0507104) **	(0. 4047716)	(0. 6173123)
GOV	0. 0237471	0. 0199481	0. 0193008	0. 016792
	(0. 0035267) **	(0. 0048796) **	(0. 0209441)	(0. 0228564)
FOR	0. 0422035	0. 0338813	0. 0556351	0. 0485887
	(0. 0041483) **	(0. 0052995) **	(0. 0267108) **	(0. 0277477)
K/L*CAI	-	-0. 0000517	-	-0. 0006875
	-	(0. 0000248) **	-	(0. 0006722)
GOV*CAI	-	3.19e-06	-	0. 0000333
	-	(1.45e-06) **	-	(0. 0000365)
FOR*CAI	-5.56e-06	-2.60e-06	0.0000177	0. 0000654
	(1.05e-06) **	(2.62e-06)	(0000171)	(0. 0000514)

Table5: Spillovers with technology gap in productivity
Dependent variable: labor productivity of domestic sector

Period	1995-1999				2000-2002			
No of observations	130				81			
R2	0.6337		0.6514		0.2411		0.2902	
	(i)		(ii)		(i)		(ii)	
Constant	-4.52406		-4.33126		-7.80861		-8.493247	
	(0.3110415)	**	(0.29024)	**	(1.689459)	**	(1.735583)	
Capital-labor ratio	0.0793739		.0424081		0. 0021506		0. 0711269	
	(0.0260011)		(.0351445)		(0. 3542715)		(0. 4780006)	
GOV	0.0182278		0. 0202045		0. 0266886		-0.00227	
	(0.0042202)	**	(0. 0044101)	**	(0. 0233423)		(0.00079)	
FOR	0.0374947		0.0397611		0. 0508508		0. 0488399	
	(0.0043897)	**	(0. 0048838)	**	(0. 0299888)		(0. 0339884)	
K/L*PRG	-		-0. 0316914		-		0. 0430951	
	-		(0.0214526)		-		(0. 1672104)	
GOV*PRG	-		0. 0015984		-		-0. 0061414	
	-		(0. 0008714)	*	-		(0. 0090828)	
FOR*PRG	-0.005523		-0. 0077515		0. 0242934		0. 0264732	
	(0.002765)	**	(0. 0031121)	**	(0. 0281733)		(0. 0302229)	

Table 6: Spillovers with domestic private sector								
Dependent variable: labor productivity of domestic sector								
Period	1995-1999				2000-2002			
	(i)		(ii)		(i)		(ii)	
No of observations	143				84			
R2	0.3942		0.1837		0.3317		0.5085	
Constant	-4.55981		-5.519851		-6.526497		-7.536424	
	(0. 2862229)	**	(0. 4478135)	**	(1.400172)	**	(1.178079)	**
Capital-labor ratio	0. 0867979		0. 089416		0.120274		0. 4389662	
	(0. 0315845)	**	(0. 0304615)	**	(0. 3227039)		(0. 2767178)	
GOV	0. 0209144		0.0274805		0. 0082067		0.0091779	
	(0. 0040439)	**	(0. 0069205)	**	(0. 017929)		(0. 0151819)	
FOR	0. 027418		0. 0377995		0. 042229		0.0403942	
	(0. 0051134)	**	(0. 0081243)	**	(0. 0211667)	**	(0. 0178085)	**
K/L*PRI	-		-0. 0007609		-		0. 0023093	
	-		(0. 0010288)		-		(0. 001227)	
GOV*PRI	-		0. 0006129		-		0. 0000416	
	-		(0. 0001539)		-		(0.00000)	*
FOR*PRI	-0.0000502		0. 0000121		0. 0002324		0. 0000368	
	(0000533)		(0. 0000928)		(0. 0000587)	**	(0. 0001005)	**

5. Concluding remarks

- The study contributes to researches on Spillover effects of FDI in Vietnam.

- FDI does have positive spillovers on domestic production in Vietnam. Positive demonstration effects are bigger in earlier periods, in later periods , market-stealing effect becomes big.

- Technology gap has influences on spillover effect only in early stages, and domestic private sector seems to play an important role for FDI's transfer to domestic production. Policies strengthening domestic private firms and linkages between foreign and domestic sectors are encouraged.